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Title: Translation ovoids of finite classical polar spaces

Summary:

A *classical polar space* $\mathcal{P}$ is the set of all subspaces of a projective space which are totally isotropic with respect to a reflexive sesquilinear form. When the projective space is finite then the polar space is called *finite*.

The *generators* of $\mathcal{P}$ are the subspaces of maximal dimension contained in it.

An *ovoid* of $\mathcal{P}$ is a set of points of $\mathcal{P}$ which meets every generator in a point. An ovoid $\mathcal{O}$ of $\mathcal{P}$ is a *translation ovoid* with respect to a point P of $\mathcal{O}$ if there is a collineation group of $\mathcal{P}$ fixing all totally isotropic lines through P and acting regularly on points of the ovoid different from P. Such a group is called the *translation group (about P)* of $\mathcal{O}$. A translation ovoid $\mathcal{O}$ is said to be *semilinear* if it has a translation group containing non-linear collineations; we call $\mathcal{O}$ *linear* otherwise.

Translation ovoids of finite orthogonal polar spaces have been intensively studied by many authors. Examples of translation ovoids of $Q^+(3,q)$ are non-degenerate conics contained in it. Translation ovoids of $Q(4,q)$ correspond to semifield flocks of the quadratic cone in $\mathrm{PG}(3,q)$ and it is known there exist three infinite families and one sporadic example. Translation ovoids of $Q^+(5,q)$ correspond to semifield spreads of $\mathrm{PG}(3,q)$ and they exists for all values of q.

The understanding of translation ovoids of finite unitary polar spaces is not as deep as that of translation ovoids of orthogonal spaces. Examples of translation ovoids of $H(3,q^2)$ are non-degenerate hermitian curves contained in it. Several other infinite families of translation ovoids of $H(3,q^2)$ are known. The intimate connection between linear translation ovoids of $H(3,q^2)$ and semifield spreads of $\mathrm{PG}(3,q)$ was highlighted by many authors.

In this talk we present results on the existence of translation ovoids of the unitary polar space $H(2m-1,q^2)$, $m \geq 3$. We also give informations on semilinear translation ovoids of $H(3,q^2)$.

The results are based on a recent joint work with Oliver H. King from Newcastle University.